Drugs of Abuse in Human Milk Purchased via the Internet

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Abstract

Background: Human milk purchased via the Internet poses a potential risk of recipient infant exposure to drugs, but this risk has not been quantitated by research. Our objective was to test milk we purchased via the Internet for 13 common classes of drugs of abuse to explore the extent of possible exposure to recipient infants.

Materials and Methods: Samples ($n = 102$) of milk purchased via the Internet were tested for 13 groups of drugs that are commonly abused using immunoassay screening to identify suspected positives, followed by liquid chromatography/tandem mass spectrometry or gas chromatography/mass spectrometry for confirmation. Sellers' advertisements were abstracted for statements about drug use or abstinence.

Results: Most (71%) sellers stated in their advertisement that they abstained from some type(s) of drugs (prescription or illicit), but 29% indicated nothing about drug use or abstinence. No sellers admitted to illicit drug use in their advertisement. No samples tested positive for the selected drugs of interest (prevalence = 0%; 95% confidence interval, 0.0, 2.9).

Conclusions: We did not detect any of the selected drugs in 102 milk samples. Our sample was too small to detect less commonly used drugs and to provide a narrow confidence interval around the prevalence estimate and did not include milk shared at no cost. Thus, these findings are exploratory and cannot rule out the possibility of drugs being present in other milk available via the Internet.

Introduction

THE INTERNET HAS ENABLED the exchange of human milk between women with an abundant supply and those who want to feed their child human milk but cannot meet their child's needs. Juxtaposed with the benefits of consuming human milk are several potential health risks to recipient infants from consuming milk from unknown sources. Because of the risks of infectious disease and exposure to illicit drugs, pharmaceuticals, and chemicals, the U.S. Food and Drug Administration cautions against feeding infants milk from unfamiliar sources.¹ We have previously documented that 74% of milk we purchased via the Internet contained high counts of aerobic bacteria or detectable Gram-negative bacteria, which may pose a risk of infection.²

Many drugs ingested by lactating women are detectable in milk.³⁻⁵ The short- and long-term health effects of infant exposure to drugs via milk remain a subject of active research and are subject to evolving clinical guidance.⁶ Healthcare providers and patients frequently must weigh the potential benefits to mothers of taking a prescription drug against the

potential risk of exposure to the infant. However, illicit drugs provide no medical benefit to weigh against potential risk to the infant. For instance, cannabis remains the most popular recreational drug and concentrates potentially eightfold in human milk, but findings about the short- and long-term effects of infant exposure via human milk are very limited.⁷⁻¹¹ One study reported motor development deficits from exposure through breastmilk.¹²⁻¹⁵ Narcotics (e.g., hydrocodone, oxycodone) and heroin have become more common substances of abuse among reproductive-age women, and narcotics have been associated with central nervous system depression and even death in infants exposed via milk.^{7,16,17} Our previous research noted that approximately 30% of women looking to donate or sell their milk online state in their post or advertisement that they are "drug free" or otherwise indicate they do not use illicit drugs, but recipients of this milk are generally unable to know for certain that the milk they receive is free of drugs that are commonly abused.¹⁸

As such, the objective of this study was to test milk purchased via the Internet for 13 categories of drugs of abuse so as to explore the extent of possible exposure to recipient infants.

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Materials and Methods

Milk sample acquisition and other data collection

During 3 months in 2012, individuals who posted an Internet advertisement looking to sell their milk on a Web site established for the purpose of connecting buyers and sellers were sent a standard e-mail inquiry expressing interest in buying a small amount of milk (details about the process of buying milk have been previously published).¹⁹ An abstraction form was used to record information conveyed in each advertisement, including whether the seller mentioned limiting or abstaining from legal or illegal drugs or pharmaceuticals (i.e., consumed limited or no alcohol; nonsmoking; stated she is “drug free” or took no illicit drugs; took no medications). Of note is that the Web form sellers used to create their advertisement did not request or require any particular information about drug use, so if drugs were mentioned it was at the seller’s own initiation.

When sellers indicated a willingness to sell, they were provided with an anonymous delivery address and payment information, tied to a rented mailbox, not the investigators’ or our institutional information. The methods used to obtain the milk samples have been previously described in detail.¹⁹ Upon receipt and inspection, the samples were stored at -20°C until they were analyzed in spring 2014.

Breastmilk samples (volume, 5 mL) were shipped to United States Drug Testing Laboratories (Des Plaines, IL) for a 13 drug panel analysis (no positive controls were sent). This panel tested for 13 individual drugs or classes of drugs that are among the most commonly abused by women of reproductive age and are of potential concern for infant exposure (screening cutoff presented for each): amphetamines (500 ng/mL) (e.g., methamphetamine), barbiturates (100 ng/mL), benzodiazepines (100 ng/mL), cannabinoids (marijuana, 40 ng/mL), cocaine (75 ng/mL), meperidine (200 ng/mL), methadone (100 ng/mL), opiates (150 ng/mL) (e.g., hydrocodone, hydromorphone), oxycodone (150 ng/mL), phencyclidine (25 ng/mL), propoxyphene (200 ng/mL), tramadol (200 ng/mL), and buprenorphine (20 ng/mL). Specimens were analyzed on an Olympus (Center Valley, PA) AU640TM chemistry analyzer using immunoassay (enzyme multiplied immunoassay technique or cloned enzyme donor immunoassay) following a solid-phase extraction procedure that captured both acid and alkaline fractions.

This study was deemed exempt from review by the Nationwide Children’s Hospital Institutional Review Board.

Statistical analysis

We calculated the proportion of samples that tested positive for each drug or drug class and a 95% confidence interval around each prevalence estimate. We also calculated the proportion of sellers who self-reported information about drug abstinence or use. Analyses used SAS version 9.3 software.²⁰

Results

We obtained 102 milk samples for analysis and abstracted the corresponding advertisement for each. Most (71%) sellers included a statement in their advertisement about abstaining from some type(s) of drugs, although 29% did not indicate anything about drug use (whether prescribed or illicit) or

TABLE 1. PROPORTIONS OF SELLERS WHO INCLUDED OR DID NOT INCLUDE STATEMENTS ABOUT DRUG USE OR ABSTINENCE IN THEIR ADVERTISEMENTS FOR HUMAN MILK ON THE INTERNET (N=102), 2012

<i>Statement about drug use or abstinence</i>	<i>n (%)</i>
“Drug free”	49 (48)
No medications, no pharmaceuticals, or no over-the-counter medications	19 (19)
No illicit drugs	7 (7)
No galactagogues	1 (1)
No statement about drugs	30 (29)

Sellers could be included in more than one category.

abstinence (Table 1). No sellers admitted to using illicit drugs or abusing drugs in their advertisement. No specimen produced a result at or above the cutoff for any drug class, and therefore no specimen required any further confirmatory testing (all prevalence proportions=0%; 95% confidence interval, 0.0, 2.9).

Discussion

In our analysis of 102 samples of milk purchased via the Internet, we found no evidence of contamination with drugs of abuse. The majority of sellers indicated in their advertisements they abstained from at least some kinds of drugs, although many statements (e.g., “drug free”) were too vague to determine whether they meant illicit drugs, pharmaceuticals, or both.

This study represents the first evaluation of potential exposure to drugs of abuse via human milk purchased via the Internet. We took many steps to remain anonymous (e.g., used a rented mailbox with no institution or investigator names attached, anonymous e-mail account) to obtain samples that were as representative as possible of those being sold online so as to avoid under- or over-representing drug users. We tested for a large number of the most commonly abused drugs, both illicit and prescription. These are the major strengths of the study.

Although our test results suggest that drug use is nonexistent or very rare among women selling human milk online, these findings should be considered exploratory because of several key limitations. First, our sample size was limited, and use of any individual drug is likely to be relatively uncommon among lactating women. For instance, the National Survey on Drug Use and Health (in 2012) reported that 5% of surveyed pregnant women reported using cannabis in the previous month, 0.3% used cocaine, and 0.2% used heroin, although use during lactation may differ.⁷ Thus a much larger sample would be required to provide a narrower confidence interval around the prevalence estimate so as to provide greater assurance that exposure risk is closer to zero than 2.9%. Second, we tested for a limited list of drugs and potentially missed other drugs if present. Additionally, our milk samples may not be representative of all milk being sold online. Furthermore, the laboratory tests can detect drug use from a specific time window, which may not have been close enough to the time of ingestion. Thus, we may have missed women who used drugs intermittently or at low doses. Finally, drug metabolites may have degraded over time during

the long storage period, to below the limits of detection leading them to be misclassified as negative.

We did not examine other prescription, over-the-counter, or illicit drugs of possible concern like the sleep aid zolpidem, alcohol, or galactogogues (e.g., metoclopramide) and herbs, which should be examined in future studies.

Conclusions

Based on the findings of this initial study, we conclude that exposure to drugs of abuse from human milk purchased via the Internet is likely uncommon. Larger future studies are needed to confirm our findings and to test for a greater range of drugs.

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Disclosure Statement

No competing financial interests exist.

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